THE INFLUENCE OF TREATMENT AND THE HERBICIDES PERIOD UPON THE AUTUMN WHEAT PRODUCTION IN THE WEST PLAIN CONDITIONS

Popovici Mariana*, Bucurean Eva

**University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048 Oradea; Romania, e-mail: mariana_mediu@yahoo.com*

Abstract

Weeds, which represent an important competitor of the wheat, can cause significant damage that may reach from 10 up to 40 % from the potential production.

The wheat can well compete with the weeds that bloom late in spring but it suffers when weeds bloom in fall or early spring before covering the soil. (Berca I., 2004) The biannual weeds are as dangerous too, their growing rhythm being superior to the wheat's growing one.(Ciorlaus A.,1978)

The research related to the influence of herbicides treatments and of the period upon the fall wheat had been done at the Les-Bihor agricultural farm over the period 2008-2010 on a brown luvic soil.

Three types of herbicides have been used in order to analyze the effect of the interaction between the treatments and the herbicides period: Icedin super(acid 2.4D 300g/l+dicamba 100g/l) - 0.75l/hectare, Lancet (fluroxypyr 80g/l+2.4D 450g/l) -1l/hectare şi Tomigan 250 EC(fluroxypyr 250g/l) + SDMA 600 0,6+1l/hectare, together with the variant upon which noi herbicides had been used.

In what the chemical destruction of the weeds is concerned the combined herbicides have got the maximum efficiency, they contain more active substances (2-3), having a larger spectre of destruction in comparison with the simple herbicides and also when they are used the obtained productions are bigger.

Key words: herbicides, weeds, the autumn wheat, the application period, *Raphanus raphanistrum*

INTRODUCTION

The destruction of the weeds in the culture of the wheat represents an important technological link that ensures obtaining a maximum production at the biological potential of the cultivated types of wheat as well a high quality of the production, having an important role in its capitalization.

The West Plain has got a high production potential but in the same time it presents a large spectre of the weed species; it may as well be an infestation potential and a special competitor for the wheat culture.

The weeds that invade the wheat culture belong to the annual and perennial dicotyledonous group and those that can germinate in autumn can also hibernate during winter (*Raphanus, Sinapis, Cirsium arvense).*

The yearly monocotyledonous weeds which also produce high and significant damage are the following: *Avena fatua, Apera spica-venti* and

the perennial ones are the following: *Agropyron repens, Sorghum halepense.*

The destruction of the weeds is mainly ensured by the rotation of the cultures. Nowadays for the fall wheat using herbicides is a compulsory measure which is usually done in spring during the vegetation period. (postemergently).

The efficiency of the postemergent herbicides depends mainly on three factors:

1. The spectrum of the destructed weeds
2. The optimum moment to destruct the weeds
3. The selection of the herbicides in relation to the culture

Besides these three factors other factors can also significantly intervene: the wheat's maximum tolerance stage, the weather conditions, the herbicide dose the tolerance of limitary plants or of the ones included in rotation, the vegetation estate of the culture, the moment when the competition between the wheat and the weed begins.

The appropriate destruction of weeds in the wheat culture has the role to decrease the weed infestation pressure for the on going culture as well as for the next culture. Thus, choosing the corresponding herbicides, the application techniques and the quality of treatments for the wheat culture represents a good investment for the future years, as well.

MATERIAL AND METHODS

The research related to the influence of the herbicides period upon the production of autumn wheat had been done at the Leş-Bihor agricultural farm, on a brown luvic soil in the years 2008-2010.

The application of hebicides had been done with a solution quantity of 300 l /hectare administered uniformly on the field.

A chemical destruction of the weeds means firstly establishing the flora composition of the weeds, the proportion of the monocotyle and dicotyle weeds.

The study of the flora composition of the weeds had been done on a monoculture rotation: two year rotation of wheat-corn, and the three year rotation of pea-wheat-corn at three levels of fertilization: N_0P_0, $N_{60}P_{80}$ şi $N_{120}P_{80}$.

The effect of the herbicides upon the autumn wheat production had been studied within the three periods of treatment application:

- First period – the twinning wheat
- Second period – 2-3 interknots;
- Third period – the apparition of the last leaf.

For the study of the interaction between the applied herbicides and the application period the following variants had been analyzed:

Factor A – herbicides applied postemergently:

a_1- without herbicides

a_2 - Icedin super(acid 2.4D 300g/l+dicamba 100g/l) - 0.75l/hectare

a_3 – Lancet RV(fluroxypyr 80g/l+2.4D 450g/l) -1l/hectare

a_4 – Tomigan 250 EC(fluroxypyr 250g/l) + SDMA 600 0,6+1l/hectare

Factor B- the application period:

b_1 –First period

b_2 – Second period

b_3 –Third period

For the analysis of the interaction between the type of herbicide and the application period (AxB) the variant without herbicides had been chosen.

The apparition of more and more diversified types of herbicides led to new studies regarding the influence of different new herbicides upon the weeds destruction degree and upon the obtained production.

For the analysis of the herbicide and production efficiency the following herbicides have been studied: the simple ones: SDMA 600 (acid 2.4 D from dimethylamine salt 600g/l), Icedin super (acid 2.4D 300g/l+dicamba 100g/l), Tomigan 250 EC (fluroxypyr 250g/l), the granulated herbicides: Glean 75 DF(chlorinesulfuron 75%), Granstar(tribenuron-methyl 75%), Logran 75WG(triasulfuron 75%) and the complex herbicides: Puma Super + Glean, Logran 25WP + SDMA 600, Ecopart + SDMA 600, in comparison with the non-herbicides variant.

RESULTS AND DISCUSSIONS

The influence of rotation and of fertilization upon the flora structure of the weeds

The flora structure of the weeds present in the wheat cultures represents an important indicator in their destruction, especially in the destruction of the ”problem weeds” which accompany the culture. The spectrum of the weed species and their frequency are determined by: the participation of the weed in the rotation, the applied fertilization level,the intensity and efficiency of weed destruction measures.

The structure of the wheat weeding in the period of 2008-2010 on the luvic soils from Leş(table 1), is composed from the monocotyledon species of weeds with an average share of 81% in the case of non-fertilized culture and reaches 19% in the case of the culture which is in the process of a three year pea-wheat-corn rotation, fertilized with $N_{120}P_{80}$. The dicotyledonous types of weeds have got a decreased share within the non-

fertilized monoculture 18-20% and they reach 80-82% in the case of the three year rotation culture and when fertilized with doses of $N_{120}P_{80}$.

From the dicotyledonous types of weeds the most frequent have been the following: *Matricaria inodora, Raphanus raphanistrum, Polygonum convolvulus, Cirsium arvense, Chenopodium sp.*, and from the monocotyledon types the prevailing had been the *Apera spica venti.*

Table 1

The flora structure of the weeds (%) from the wheat culture, wheat grown in different rotations and levels of fertilization over the period 2008-2010

Weeds	Monoculture			Wheat-Corn			Pea-wheat-corn		
	N_0P_0	$N_{60}P_{80}$	$N_{120}P_{80}$	N_0P_0	$N_{60}P_{80}$	$N_{120}P_{80}$	N_0P_0	$N_{60}P_{80}$	$N_{120}P_{80}$
Apera spica venti	82	81	80	68	65	60	20	18	19
Matricaria inodora	5	6	5	12	11	13	25	23	20
Raphanus raphanistrum	4	5	4	6	5	7	27	21	17
Polygonum convolvulus	3	2	3	7	8	6	12	13	15
Cirsium arvense	2	3	3	4	5	4	9	11	13
Chenopo-dium sp.	3	2	2	3	4	6	5	12	16
Other species	1	1	1	0	2	4	2	1	1

The influence of the interaction between the type of period and the herbicide upon the wheat production

The optimum moment of herbicides application depends on the maximum sensitivity stage of the weeds, this stage can be between the rosette phase and 2-4 leaves as well as on the maximum culture tolerance phase which exists between the twinning and the formation of the first differentiated knot. The maximum effect of the herbicides is obtained in favorable weather conditions: enough humidity and average temperatures of over 8-10 Celsius degrees.

The effect of the herbicides and of the treatment application period over the wheat production are presented in table 2.

The herbicides applied in the three treatment periods present certain variations. Thus, the variants treated with the herbicide Icedin super on the basis of dicamba realizes productions higher with 1.010t/hectare, 31.07% respectively, if being applied in the first period, in contrast with the third period when it realizes positive differences of 0.700t/hectare, 21.53% respectively.

For the other applied herbicides the production was higher 1.060t/hectare and 0.730t/hectare respectively in the case of the Lancet herbicide and 1.030t/hectare and 0.910 t/hectare in the case of the combined

herbicides of Tomigan 250EC+SDMA 600 by applying these herbicides in the second and in the third period, not in the first one. These types of herbicides realize a higher production due to the treatment application flexibility in the second and third period when the majority of the active substances have got great selectivity.

Tabel 2

The influence of the interaction between the period and the treatment over the wheat production(2008-2010)

No. crt.	Herbicides	Dose l/ha	Period	Production t/ha	Differences		Signification
					± t/ha	%	
1.	Not treated	-	-	3250	-	100	-
2.	Icedin super	0.75	P I	4.260	1.010	131.07	***
			P II	4.130	0.880	127.07	***
			P III	3.950	0.700	121.53	***
3.	Lancet	1	P I	3.840	0.590	118.15	***
			P II	4.310	1.060	132.61	***
			P III	3.980	0.730	122.46	***
4.	Tomigan 250 EC + SDMA 600	0,6+1	P I	3.970	0.720	122.15	***
			P II	4.280	1.030	131.69	***
			P III	4.170	0.910	128.30	***

LDS 5%=0.34 LDS 1%=0.51 LDS 0.1%=0.69

The influence of herbicides upon the efficiency and upon the wheat production

The destruction of the weeds represents an important objective of the research, new herbicides being obtained with superior qualities: increased efficiency by the apparition of combined herbicides based on 2 or 3 active substances that ensure the increase of the destruction degree. ; using small doses for a hectare due to the apparition of the sulfonylureas herbicides and to a higher flexibility at the application period.

Simple herbicides: SDMA 600, Icedin super, Tomigan 250 EC, solve only partially the destruction of the weeds because not all the species are sensitive to these substances.

Granulated treatments: Glean 75 DF, Granstar, Logran 75WG are selective for the wheat plants and ensure a 90-93% destruction for the dicotyledonous weeds.

Combined herbicides: Puma Super + Glean, Logran 25WP + SDMA 600, Ecopart + SDMA 600 have got the highest degree of destruction, of 93-95% and realize superior grain productions in comparison with the standard treatment (Icedin super).

The efficiency of the applied herbicides represented by the destruction degree of the weeds and by the obtained wheat production is presented in table 3.

Table 3

The influence of herbicides upon the efficiency and upon the wheat production(2008-2010)

No. crt.	Applied herbicides	MU(measure unit)	Dose	Application period	Destruction degree %	Average production			Signification
						± t/ha	%	Difference ± t/ha	
1	Not treated	-		Post-emergently	0	3.320	-	-	
2	SDMA 600	l/ha	0.8	Post-emergently	70	3.580	107.83	0.260	-
3	Icedin super	l/ha	1	Post-emergently	85	4.130	124.39	0.810	***
4	Tomigan 250 EC	l/ha	0.8	Post-emergently	90	4.340	130.72	1.020	***
5	Granstar	g/ha	25	Post-emergently	93	4.420	133.13	1.200	***
6	Logran 75WG	g/ha	10	Post-emergently	90	4.380	131.92	1.060	***
7	Glean 75DF	g/ha	25	Post-emergently	93	4.400	132.53	1.080	***
8	Puma Super + Glean	l+g /ha	0.8+ 20	Post-emergently	96	4.620	139.15	1.300	***
9	Logran 25WP + SDMA 600	g+l/ ha	10+ 0.8	Post-emergently	95	4.570	137.65	1.250	***
10	Ecopart + SDMA 600	l	0.3+1	Post-emergently	93	4.520	136.14	1.100	***

The analysis obtained by using the three types of herbicides meaning simple, the granulated and combined ones show great variations of the weed destruction degree as well as of the obtained production, in comparison with the witness non-treated variant.

In the case of the simple herbicides the destruction degree is of 79-90% and the production increase is of 0.260-1020 t. The 1.020 t increase in the case of herbicidation with Tomigan is due to the fact that this type of herbicide has got a higher application flexibility and because it can be applied at least month before the harvest.

The granulated applied herbicides realize up to 33.13% production increases, meaning 1.080 t/hectare, when Granstar herbicide was used, in comparison with the non-herbicides variant.

The treatments with combined herbicides have obtained superior results upon the weed destruction degree as well as upon the wheat production, in comparison with the non-treated variant but also in comparison with the standard Icedin super treatment. Thus, the weed destruction degree is of 93-96 % and the production increase reaches 36.14-39.15 %, meaning 1.100-1.300 t/hectare, in comparison with the variant where no herbicides were used.

CONCLUSIONS

The studies done at the Leş agricultural farm on a period of three years emphasizes the effect of herbicides upon the wheat production, in a tight relation with the treatment application period and the type of the applied herbicide.

The optimum period of treatment application is then when the dicotyledonous weeds are in the rosette stage, in the stage of active growth, when the herbicides are assimilated and translocated in the plant more rapidly.

By using the Icedin super herbicide in the first period the production increase obtained is of 31.07% in comparison with the non-herbicide variant and by using it in the third period the production increase reaches only 21.53 %. The influence of the herbicides upon the efficiency and upon the wheat production presents different kinds of amplitude according to the applied category of herbicides.

The best results are obtained with combined herbicides that have a larger weed destruction spectrum. The weed destruction degree and the productions are significantly superior when the treatment had been done with combined herbicides.

The weed destruction degree in the case of combined herbicides is of 93-96 % in comparison to 70-90 % in the case of simple herbicides and in comparison with 90-93 % in the case of granulated herbicides.

The production increase reaches 36.14 % - 39.15 % in the case of the combined herbicides, in comparison with the non-herbicide variant, then it reaches 7.83 – 30.72 % in the case of simple herbicides and 31.92 %- 33.13 % in the case of the granulated herbicides.

REFERENCES

1. Bîlteanu Gh.,V. Bîrnaure,2003 - Fitotehnie, Editura Ceres, Bucureşti
2. Borcean I., Ghe. David, A.Borcean, 2006 – Tehnici de cultură şi protecţie a cerealelor şi leguminoaselor, Editura de Vest, Timişoara
3. Berca Mihai, 2004 –Managementul integrat al buruienilor, Ediura Ceres, Bucureşti
4. Csep N.,V.Bara, Elena Bucurean, cornelia Ciobanu, Ioana Chebeleu, M.Gîtea, 2006-Protecţia eficientă şi sigură a plantelor faţă de buruieni. Elemente de legislaţie fitosanitară, Editura Universităţii din Oradea
5. Manoliu Al., N. Ştefan, V. Zanoschi, Tatiana Şesan, 1996 – Buruienile din culturile agricole şi bolile lor, Editura Ceres, Bucureşti
6. Păcurar Ion,2007 - Producerea seminţelor de cereale, leguminoase pentru boabe şi plante tehnice, Editura Phoenix, Braşov
7. Popovici Mariana, 2010 – Producerea de sămânţă la grâul de toamnă în condiţiile Câmpiei de Vest, Editura Universităţii din Oradea
8. Popescu C., Stela Duvlea, A.Olteanu, 1983 - Agrofitotehnie, Editura didactică şi pedagogică, Bucureşti
9. Soare Marin, 2006 – Producerea, controlul şi certificarea seminţelor, Editura Sitech, Craiova
10. Şarpe N.,Gh. Strejan, 1981 - Combaterea chimică a buruienilor din culturile de câmp, Editura Ceres, Bucureşti